

# Claims

- [c1] 1.A welding stud comprising:  
a body having a first end and a second end;  
the first end constructed to engage a stud welding gun;  
and  
the second end having at least one recess formed therein.
- [c2] 2.The welding stud of claim 1 wherein the recess is designed to decrease an effective arc area of the second end to a workpiece.
- [c3] 3.The welding stud of claim 1 further comprising one of a powdered metal encapsulated and a combination of flux and powdered metal encapsulated in the second end.
- [c4] 4.The welding stud of claim 1 further comprising a plurality of recesses, wherein the recesses are concentric about an axis of the stud.
- [c5] 5.The welding stud of claim 1 further comprising a plurality of recesses, wherein the recesses are annular grooves.

- [c6] 6.The welding stud of claim 1 further comprising a nipple extending from the second end at a center axis of the stud for initiating contact with a workpiece and defining a gap between the workpiece and the second end.
- [c7] 7.The welding stud of claim 1 wherein the first end has a flange extending outwardly to engage the stud welding gun.
- [c8] 8.The welding stud of claim 1 further comprising a plurality of recesses, wherein the recesses are geometrically centered about the second end.
- [c9] 9.The welding stud of claim 1 further comprising a plurality of recesses, wherein the plurality of recesses are defined by a plurality of protrusions extending away from the welding stud and toward a workpiece.
- [c10] 10.A welding stud comprising:  
a connector end constructed to engage a stud welding gun;  
a body extending from the connector end;  
a weld end constructed to be welded to a workpiece; and  
wherein the weld end has at least one protrusion extending outwardly to space a majority of the weld end from a workpiece, wherein the majority of the weld end

has a non-planar surface.

- [c11] 11.The welding stud of claim 10 further comprising a plurality of grooves and ridges formed in the weld end to form the non-planar surface.
- [c12] 12.The welding stud of claim 10 further comprising one of a combination of flux and powdered metal capsule and a powdered metal capsule within the weld end.
- [c13] 13.The welding stud of claim 11 wherein the plurality of ridges are geometrically centered about a longitudinal axis of the welding stud.
- [c14] 14.The welding stud of claim 11 wherein the plurality of ridges are annular.
- [c15] 15.The welding stud of claim 14 wherein the plurality of ridges are concentric.
- [c16] 16.The welding stud of claim 10 wherein the at least one protrusion includes a nipple extending from a center of the weld end beyond an outward-most tip of each of the plurality of ridges.
- [c17] 17.The welding stud of claim 11 wherein each ridge has a base and wherein a height of the ridge is substantially similar to a width of the base.

- [c18] 18.A method of manufacturing a welding stud comprising the steps of:  
providing a welding stud having a first end and a second end;  
forming the first end to engage a stud welder; and  
forming the second end with increased resistance to current flow as compared to a welding stud having a nipple and a generally planar surface thereabout.
- [c19] 19.The method of claim 18 further comprising the step of forming one of a flux and powdered metal combination pocket and a granular metal pocket in the welding stud.
- [c20] 20.The method of claim 18 wherein the step of forming the second end further comprises stamping a plurality of grooves therein.
- [c21] 21.The method of claim 18 wherein the step of forming the second end further comprises etching a plurality of grooves therein.
- [c22] 22.The method of claim 18 wherein the step of forming the second end further comprises machining a plurality of grooves therein.
- [c23] 23.The method of claim 18 wherein the step of forming the first end further comprises the step of forming the

first end to engage a connector.

[c24] 24.The method of claim 18 wherein the step of forming the second end increases the density of a current passed therethrough during a welding process.

[c25] 25.A welding stud comprising:  
a first end constructed to engage a stud welding gun;  
a body extending from the first end to a face of a weld end;  
means for localizing current density in the face of the weld end of the welding stud.

[c26] 26.The welding stud of claim 25 wherein the means for localizing current density comprises a plurality of peaks formed in the face of the weld end about a nipple.

[c27] 27.The welding stud of claim 25 wherein the means for connecting the welding stud is further constructed to engage a connector.

[c28] 28.A welding stud comprising:  
a body having a first end and a second end;  
the first end constructed to engage a stud welding gun;  
and  
the second end having a nipple and constructed thereabout with at least a portion having decreased arc surface area.

[c29] 29.A welding stud comprising:  
a body having a first end and a second end;  
the first end constructed to engage a stud welding gun;  
and  
the second end having a surface constructed with at  
least one protrusion arranged to face a workpiece and a  
remaining surface that is configured with a contact area  
that is decreased compared to a planar surface.